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Data Science, Intelligence & Society

Preparing a PhD in the Age of LLMs Responsible Use of Generative AI for Scientific Research

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de la recherche



To begin: interactive activity

Scan the
QR code !



Paris-Saclay AI charter

A | AI as an assistance tool, not a substitute

Generative AI should assist research activities but must never replace human judgment, analysis, or critical thinking

- **Use generative AI to:** explore the literature, rephrase text, assist with code writing, structure ideas...
- **Do not use IA to:** produce a scientific result, interpret results, write/translate a paper without supervision, review a paper...

B | The researcher remains responsible for their production

Everyone remains fully responsible for content produced with or without AI: an AI-generated error becomes your error as soon as you use it

- Beware of hallucinations (references, methods, statistical values....)

C | Systematically verify all generated content

AI-generated responses should be considered as suggestions rather than established truths: Trust but verify

- Always verify references, citations, figures, methods and statistical results

It is your responsibility!

Paris-Saclay AI charter

D | Transparency about AI usage

AI usage for content production must be explicit: AI is not a problem. Hiding its use can become one

- For substantial writing (text, code, images): not necessary for grammatical correction!
- **If the text is written by AI, the PhD student cannot claim the authorship**

E | Protect data and promote sovereign tools

Never transmit sensitive information to unapproved tools and prioritize European or sovereign solutions

- **Prioritize ILAAS** use (for substantial writing (text, code, images))
- **Never input sensitive data into a commercial generative AI:** HR data; , unpublished manuscripts, industrial contracts, reviews...

If you would not send the document to a stranger on internet, don't send it to a public LLM

F | Use AI sparingly and be responsible

AI is not free: every query has an environmental cost. It should be used judiciously

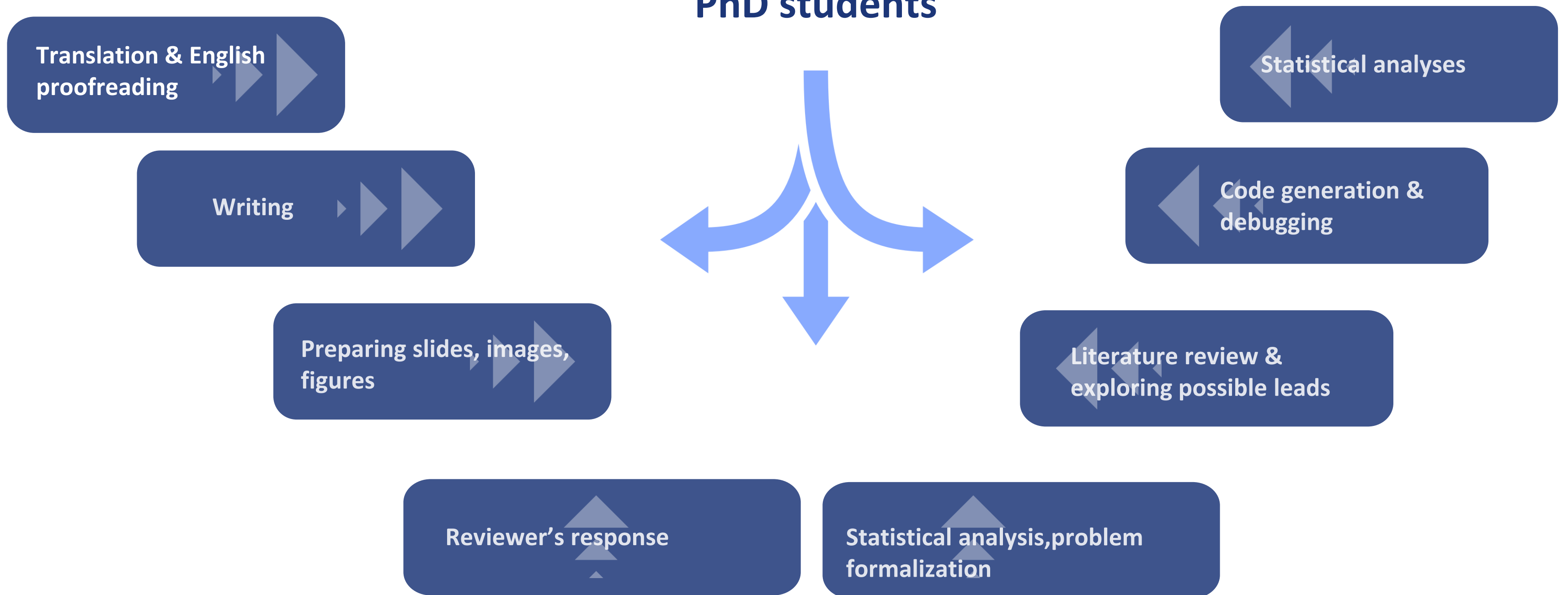
- **Before each use**, ask yourself:
Does AI provide real value?
Can I do this more simply ?
Does the scientific benefit justify the cost?

Paris-Saclay AI charter

“Generative AI can accelerate research, but it must never replace scientific rigor, critical thinking, or the researcher’s responsibility.”

AI and scientific research

Common uses of LLMs by PhD students



AI and scientific research

Research-oriented AI toolsOutils



Elicit
Analysis and synthesis of
research papers



Consensus
Answers questions based on
scientific studies



Semantic Scholar
Searches for and verifies
scientific publications



NotebookLM
RAG/ writing



Connected Papers
Visualizes links between scientific
papers



Github copilot
Programming



Research Rabbit
Automatically finds papers
related to a topic

Purpose

- Quickly explore a field
- Compare approaches
- Map a research field
- Identify key papers

Key points to remember !

ILAAS
&
Aristote

Sovereign generative AI

The specific case of manuscript writing

How can AI help you



Writing quality

- Correct spelling
- Rephrase complex sentences
- Adapt the language level

Structure the text

- Create an outline
- Break down into sub-parts

Be efficient!

- Generate check-lists
- Translate a text (remember to proofread it!)
- Correct a translated text

*Beware of public AI
confidentiality*



What you must never do

- Generate a complete manuscript
- Keep generated text without proffreading if (even for translations or statistical tests)
- Invent or accept unverified references
- Upload confidential documents online
- Use AI to hide knowledge weaknesses

! **Never use a sentence in a manuscript that you could not defend before your thesis committee or a reviewer** !



Opportunities

Accelerate research

- Quickly explore the literature
- Write more efficiently
- Generate code
- Translation

Cope with the explosion for scientific literature

- Comprehensive monitoring
- Support for identifying key papers

Lower some barriers

- Non-native English speakers
- Early-career researchers



Risks

Hallucinations & bias

Loss of critical thinking

- Temptation to stop checking
- Loss of critical analysis
- Technological dependence

Treats to scientific integrity

- Inadvertent plagiarism, transparency lack

Data confidentiality

- Some platforms reuse the data sent
- Publication of your research results and patent filing by someone else before you
- If you cannot send the document to an unknown sender on the internet, do not send it to LLM public



Limitations

AI does not understand science

It does not formulate a research question or hypotheses, build a robust experimental strategy, and cannot evaluate scientific relevance

AI does not guarantee the accuracy of its results

They may be false, outdated, or incomplete

AI does not replace expertise

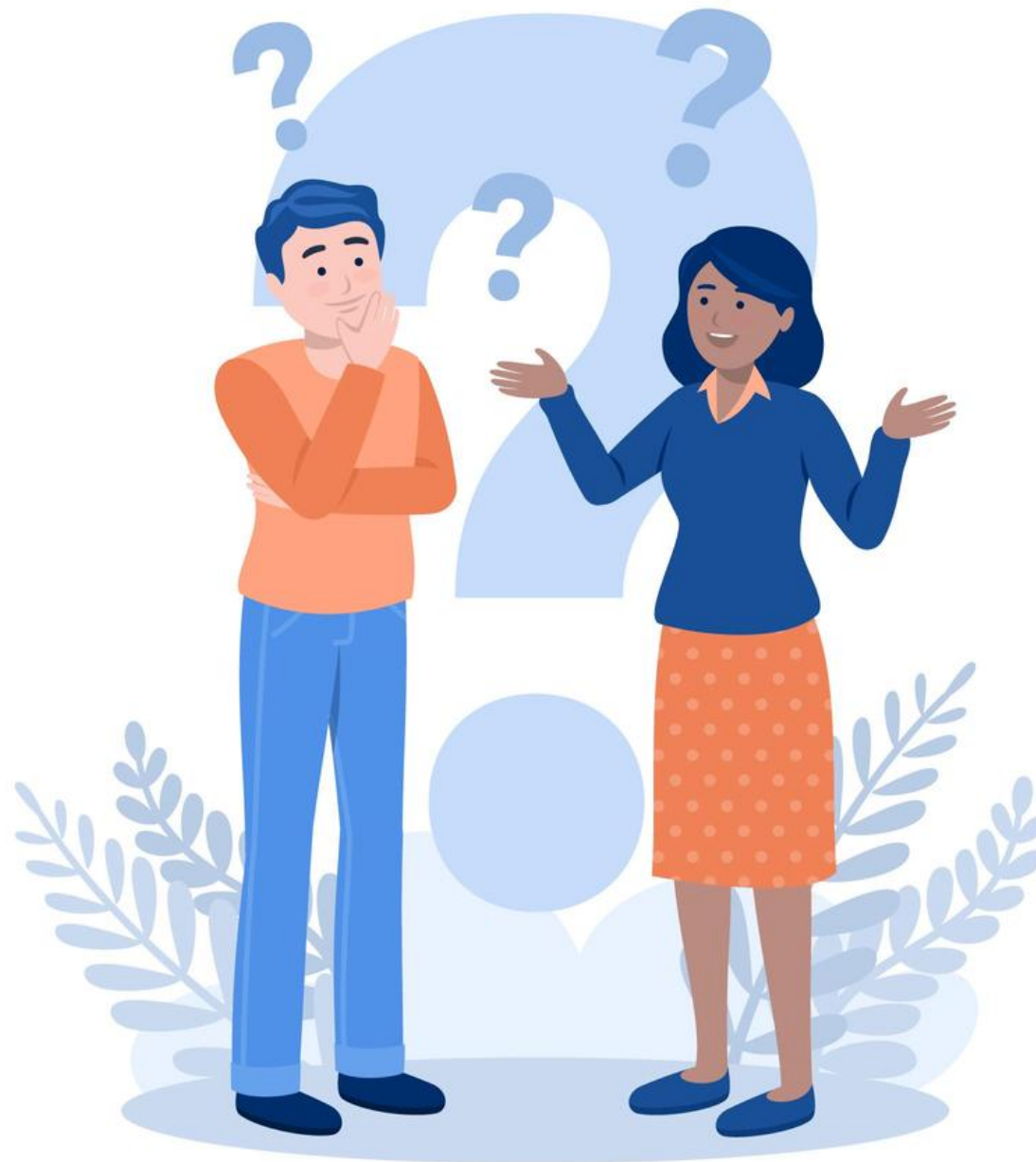
It is the researcher who must acquire expertise and create knowledge (this is the profession you need to learn)!

The **10** commandments for PhD students in the age of AI*

- | | | | |
|---|--|----|---|
| 1 | I keep intellectual control over my work | 6 | I document my use of AI |
| 2 | I verify all generated information | 7 | I am transparent about its use |
| 3 | I read the papers I cite | 8 | I maintain my critical thinking |
| 4 | I understand the code I run | 9 | I respect scientific integrity |
| 5 | I protect sensitive data | 10 | I consider AI as an assistant, never as an author |

A good PhD student is not the one who uses AI the least, but the one who knows when not to trust it

Discussion and questions



Resources

- Charter for the use of generative AI at Université Paris-Saclay:
<https://www.dataia.eu/Charte IA Universite Paris-Saclay.pdf>
- Doctoral training at Université Paris-Saclay:
[Catalogue Adum - Formation doctorale](#)
- AI Use – Académie des sciences:
<https://comptes-rendus.academie-sciences.fr/page/intelligence-artificielle/>
- INRAE – Use of AI in research:
<https://science-ouverte.inrae.fr/fr/offre-service/fiches-pratiques-et-recommandations/guide-du-bon-usage-des-assistants-base-dintelligences-artificielles-generatives#note%205>
- HAL open science – How to disclose the use of AI in a scientific publication:
<https://shs.hal.science/halshs-04756419/document>

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